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Testicular hypertrophy as a predictor for contralateral monorchism: Retrospective review of prospectively recorded data

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Summary

Objectives
Testicular hypertrophy has previously been evaluated as a predictor of monorchism. However, its implication in clinical practice is not well evaluated. The aim of the present study was to examine its value in planning the operative time.

Patients and methods
Medical charts of prospectively recorded data of 76 consecutive patients with unilateral impalpable testis from 2011 to 2014 were reviewed at the present institute. Inclusion criteria included prepubertal patients with non-palpable testes by examination under anesthesia. Contralateral testes were prospectively measured using a Takihara orchidometer. Orchiectomy or orchiopexy was performed according to the viability of the undescended testis (UDT). Collected data included age of surgery, contralateral testicular size, surgical time and laparoscopic findings. A ROC curve was used to define the best cut-off volume of the contralateral testis that can predict ipsilateral testicular viability. The Student's *t*-test was used to examine if this cut-off volume would be useful in allocating the operative time.

Results
Of 76 patients, four palpable testes by examination under anesthesia were excluded. The remaining 72 patients were included in the study. Ipsilateral normal viable testes were found in 26 (36.1%) patients, while 46 (63.9%) had non-viable testes (testicular nubbins or vanishing testes) (Figure). A contralateral testicular volume >2 ml was significantly predictive for monorchism with 71.7% sensitivity and 100% specificity ($P < 0.001$). The mean operative time for management of UDT with a contralateral size >2 ml was 50 min, which was significantly shorter than that for UDT with a contralateral size ≤2 ml, which was 88 min ($P < 0.001$).

Discussion
In previously published reports, the cut-off value for testicular hypertrophy that predicts monorchism greatly varied. This is likely due to the different methods used for testicular measurements that make it impractical to make a direct comparison. The usefulness of predicting monorchism before surgery has not previously been used as a guide for allocating operative time in the management of a unilateral non-palpable testicle. This study had some limitations, including a relatively small sample size and involvement of different surgeons, which may have affected the operative time.

Conclusion
Using the cut-off volume of a contralateral testis >2 ml as a predictor for monorchism can reduce the allocated operative time by approximately one third.

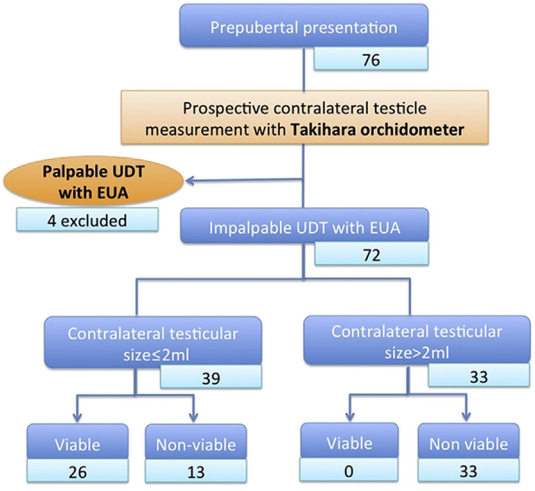

Figure Hierarchy demonstrating the study results. EUA, examination under anesthesia; UDT, undescended testes.

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Introduction

Cryptorchidism is considered to be the most common congenital genital anomaly in males [1]. The incidence is about 2–4% of full-term newborns and 1% at the age of 1 year [1]. Approximately 20% of undescended testes are impalpable [2]. Impalpable testes may be abdominal or peeping (25–50%), vanishing (15–40%), or of extra-abdominal location, but non-palpable due to body habitus or testicular size (10–30%) [3,4]. An MRI or ultrasound is not clinically reliable for detecting impalpable testes [5,6]. Laparoscopy is considered to be the main tool to confirm or exclude the presence of a viable testis [3,7].

Contralateral testicular hypertrophy has been shown as a good predictor for monarchism [8–12]. Testicular hypertrophy is a physiological response to the absence of the other testis for physical maturation and sexual development [8]. Laron and Zilka were the first to use contralateral testicular hypertrophy as a predictor of vanishing or nubbin testis [8].

Koff found that contralateral testicular hypertrophy occurs between the age of 8 months and 3 years. Also, he postulated that a contralateral testicular volume >2 ml has a good predictive value for monarchism [13].

The prediction of monorchism has no implication on clinical practice except for parents' assurance. In the present study, the contralateral testicular volume to the mean operative time was correlated. To evaluate the contralateral testicular hypertrophy as a predictor of monarchism, medical charts of patients who were previously recorded to have unilateral impalpable testis were reviewed.

Patients and methods

The medical charts of prospectively recorded data for 76 consecutive prepubertal patients with unilateral impalpable testis between 2011 and 2014 were reviewed. Inclusion criteria included: prepubertal patients with unilateral undescended testis that was not palpable by examination under anesthesia (EUA). Exclusion criteria included: history of ipsilateral inguinal surgery or hormonal treatment, and patients with disorders of sexual differentiation. Relevant data were collected, including the side of undescended testis (UDT) and age at surgery.

In addition, a pre-operative scrotal and inguinal examination was performed and the contralateral testicular volume was prospectively measured using the Takihara orchidometer. The Takihara orchidometer consists of sixteen Takihara orchidometer (medesign Gmbh, Germany) punched-out rings; each ring equals a volume from 1 to 16 ml. The orchidometer was fitted on the testis after stretching the scrotal skin over it. When the measurement was between two volumes, 0.5 ml was added to the lesser volume, for example: when the testis lay between 1 and 2 ml, the size was assumed to be 1.5 ml.

All patients underwent EUA before surgery, and if the testis was not felt, a diagnostic laparoscopy was performed. Only five cases with impalpable testes were managed by initial inguinal exploration due to ultrasound documentation of intra-abdominal testis, or the surgeon felt scrotal appendages that suggested presence of a nubbin. During diagnostic laparoscopy, if there were signs of vanishing testis, like end-blinded vessels, the procedure was terminated and if not, orchiopexy (for viable testes) or orchiectomy (for testicular nubbins) was performed. The laparoscopic findings, initial status and location of the testis were recorded.

Statistical analysis for collected data was performed using SPSS 20 (IBM Corp. in Armonk, NY). A ROC curve was used to evaluate the best cut-off volume for testicular hypertrophy that predicts the viability of the impalpable testes. The Mann–Whitney U test was used to evaluate the status of the UDT in relation to the size of the contralateral testis. The Student's *t*-test was used to examine if this cut-off volume would be useful in allocating the operative time. The *P*-value was significant when $P < 0.05$.

Results

Of 76 cases, four patients with palpable testes by EUA were excluded. None of the reviewed patients had previous inguinal surgery, received hormonal treatment or presented with disorders of sexual differentiation.

Forty-six cases (63.9%) had non-palpable undescended testis on the left side and 26 cases (36.1%) on the right side. The median age of the patients at surgery was 19.7 months (range 8.4–109.4); 70/72 (97.2%) patients were <6 years.

Testicular sizes, which were measured by the orchidometer, ranged between 1 and 3.5 ml. It was observed that no patient was managed with orchiopexy when the contralateral testicular size was >2 ml. According to the laparoscopic findings, the patent internal ring was not reported when the contralateral testicular size was >2 ml ($P < 0.001$).

Viable testes were found in 26 (36.1%) patients and all were managed with orchiopexy. Testicular nubbins were found in 34 (47.2%) patients, while 12 (16.7%) cases had vanishing testes.

The initial location of the testis was tabulated according to the status of the UDT (Table 1). All testicular nubbins

Table 1 The localization regarding to the pathology of the testis.

Status	Location				Total (%)
	Scrotum	Inguinal	Peeping	Abdominal	
Normal (%)	0	1 (7.7)	13 (50)	12 (46.3)	26 (36.1)
Nubbin (%)	27 (79.4)	6 (17.6)	0	1 (3)	34 (47.2)
Vanishing (%)	0	0	0	12 (100)	12 (16.7)
Total (%)	27 (37.5)	7 (9.7)	13 (18.1)	25 (34.7)	72 (100)